



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/082,710	02/25/2002	Robert W. Allington	18-587-9-1	5831
23898	7590	01/28/2004		
VINCENT L. CARNEY LAW OFFICE P.O. BOX 80836 LINCOLN, NE 68501-0836				
			EXAMINER ROGERS, DAVID A	
			ART UNIT 2856	PAPER NUMBER

DATE MAILED: 01/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/082,710

Applicant(s)

ALLINGTON ET AL.

Examiner

David A. Rogers

Art Unit

2856

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on amendment filed 13 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 and 28-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 28-30 is/are rejected.
- 7) ☒ Claim(s) 11 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.  
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Drawings***

1. The new formal drawings were received on 13 November 2003. These drawings are acceptable, however the fax received by the office containing the new formal drawings are replete with black marks. It is advised that the applicant reprint the new formal drawings and mail them to the patent office. As all applications are being scanned to electronic format, clean drawings are paramount to being able to be reproduced should the application be allowed.

### ***Specification***

2. The disclosure is objected to because of the following informality. Line 5 of the section titled "Related Cases" on page 1 please add the phrase --now United States Patent 6,427,526-- after the February 27, 2001 date. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2-8 and 28-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "low bandwidth" in claims 2 and 3 is a relative term which renders the claim indefinite. The term "low bandwidth" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. See "SAE Dictionary of Aerospace Engineering" to Cubberly, page 67 where bandwidth is defined as:

Art Unit: 2856

1. The difference, expressed in hertz, between the two boundaries of a frequency range;
2. A group of consecutive frequencies constituting a band that exists between limits of stated frequency attenuation. A band is normally defined as more than 3.0 decibels greater than the mean attenuation across the band;
3. A group of consecutive frequencies constituting a band that exists between limits of stated frequency delay; or
4. The range of frequencies that can be transmitted in an electronic system.

In all, the specification does not provide for the proper definition of "low bandwidth" as there is no stated range of frequencies to which the applicant is attempting to gain protection.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent 4,678,917 to Helms *et al.* in view of United States Patent 6,019,897 to Horsman *et al.* Helms *et al.* teaches an improved polychromatic spectrophotometer method and apparatus which is particularly useful in the field of liquid chromatography in which a solvent solution carrying one or more materials to be analyzed is introduced into a chromatograph column, and the eluent issuing from the column is optically analyzed in a sample cell. The apparatus comprises a sample cell (reference item 14), a reservoir (reference item 232) for a solvent which may consist of one or more solvent liquids, a pump (reference item 236) to pump the solvent from the reservoir. A known volume of the material which is to be tested is injected into the

Art Unit: 2856

solvent through a syringe (reference item 240) at the injection valve (reference item 238), and the pressure of the pump forces the solvent with the solute through a chromatograph column (reference item 244), which terminates in the sample cell. Analysis of the column is provided using radiation from a deuterium lamp (reference item 10) directed to a reflector (reference item 12) and then through the sample cell. The radiation emanating from the cell is directed to a diffraction grating (reference item 18) which diffracts the emanated radiation into a polychromatic, spatially divergent beam and directs the divergent beam to a linear array of photodetectors (reference item 22). Different spectral segments of the beam are intercepted by different photodetectors within the array. The signals from all of the photodetectors are separately and substantially simultaneously sampled and held to thereby obtain data usable for a high-accuracy, wide-spectrum chromatogram. To accomplish this purpose, the signals from the photodetectors are carried through separate signal channels including connections (reference item 24) to amplifiers (reference items 26, 28, and 94), and from the amplifiers to sample-and-hold circuits (reference items 96, 98, and 164). Helms *et al.* also teaches that there will be 35 photodetectors in the array, with associated amplifiers and sample-and-hold circuits. The sample-and-hold circuits are controlled by a multiplex switch (reference item 166) operating in response to control signals from a sequence control (reference item 168) through a connection (reference item 170). The multiplex switch causes the sample-and-hold circuits to simultaneously sample, then to stop sampling and simultaneously "hold", and then to cause a sequential read-out of the analog quantities represented by those signals for conversion from analog to digital form in an analog-to-digital converter (reference item 172). As such, the sample-and-hold circuits are non-switching circuits as the overall switching functionality is

Art Unit: 2856

provided by the controller and the multiplex switch. Furthermore, the sample-and-hold switches inherently have an associated bandwidth. The sequence controller also controls the A/D converter. The resultant digital data is then stored and processed. The signals held in the sample-and-hold circuits (reference items 212, 214, and 230) are processed by the multiplex switch and the A/D converter in exactly the same way. Finally, Helms *et al.* teaches that the system provides a signal-to-noise ratio improvement of about ten to one, in addition to providing for a much faster data rate. Helms *et al.* does not teach a chromatograph comprising a plurality of flow cells. Horsman *et al.* teaches a liquid chromatograph comprising a plurality of pumps (reference item 14A-14D) and flow columns (reference item 12). Horsman *et al.* further admits that it is well known in the prior art to use a single pump to simultaneously provide solvent to multiple columns operating simultaneously such as the commercially available Parallax HPLC available from Biotage wherein a common electrical motor simultaneously drives pistons in four pumps supplying solvent to four respective chromatography columns connected in parallel. Horsman *et al.* teaches that the preferred apparatus has the advantage of very high throughput of solvent through the chromatography columns. The system can be used to purify or analyze one sample using many different types of media or different solvent systems to evaluate the performance, selectivity, and differences. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Helms *et al.* with the teachings of Horsman *et al.* in order to provide a liquid chromatograph with a plurality of sample columns and a multiplex circuit for sampling and controlling the sampling.

7. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Helms *et al.* in view of Horsman *et al.* as applied to claim 1 above, and further in view of United States Patent

Art Unit: 2856

4,902,886 to Smisko. Helms *et al.* in view of Horsman *et al.* teaches the use of a multiplexing circuit for controlling a plurality of input sample-and-hold circuits as part of a liquid chromatograph. Helms *et al.* in view of Horsman *et al.* does not teach the use of at least one low-bandwidth circuit. The sample-and-hold switches inherently have an associated bandwidth. Smisko teaches an apparatus and method for reducing noise in a light sensing circuit having a photodiode array for spectrometers. Smisko clearly states that low-bandwidth circuits are beneficial for noise reduction in the photodiode array. Smisko does not teach the use of a low-bandwidth circuit that is a non-switching circuit. However, the specific teaching of the benefit of low-bandwidth can be easily applied to any circuit type as required by one of ordinary skill in the art. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Helms *et al.* in view of Horsman *et al.* with the teachings of Smisko in order to provide a chromatograph/spectrograph with at least one low-bandwidth circuit for noise reduction.

8. Claims 4, 28, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helms *et al.* in view of Horsman *et al.* and Smisko as applied to claims 1 and 2 above, and further in view of United States Patent 3,964,864 to Dahms. Helms *et al.* in view of Horsman *et al.* and Smisko teaches the use of a multiplexing circuit for controlling a plurality of input sample-and-hold circuits as part of a liquid chromatograph. As seen in Helms *et al.* there is a light source (reference item 10) that emits radiation to a reflector (reference item 12), through a sample cell (reference item 14) and then to a diffraction grating (reference item 18) where it is then passed to a series of photodetectors (reference item 22). The sample cell would normally have a series of light guides that allows the radiation from the light source to be properly directed

Art Unit: 2856

through the solute in the sample cell. In Helms *et al.* there are a plurality of cells (reference items 14 and 182) each receiving and transmitting light. Combined with the teachings of Horsman *et al.*, one would know to provide a sample cell that allows light to traverse through the cell to a photodetector. Helms *et al.*, however, does not expressly teach the use of light guides. In the event that Helms *et al.* does not have light guides, Dahms teaches a chromatography system comprising a sample cell (reference item 10) as best seen in Figure 2. The apparatus comprises a light source (reference item 84) and a collimating lens (reference item 86) that directs radiation to a first light guide (reference item 82), through a sample, and then through a second, adjacent light guide (reference item 80) before reaching a light detector (reference item 90). As seen in figure 2 of Dahms the cell is large enough to allow the solute/sample to flow around the light guides. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Helms *et al.* in view of Horsman *et al.* and Smisko with the teachings of Dahms in order to obtain at least one sample cell comprising adjacent light guides so that the radiation from the light source is properly focused and/or otherwise directed through the sample so that proper chromatography results can be obtained.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Helms *et al.* in view of Horsman *et al.* as applied to claim 1 above, and further in view of United States Patent 3,964,864 to Dahms. Helms *et al.* in view of Horsman *et al.* teaches the use of a multiplexing circuit for controlling a plurality of input sample-and-hold circuits as part of a liquid chromatograph. As seen in Helms *et al.* there is a light source (reference item 10) that emits radiation to a reflector (reference item 12), through a sample cell (reference item 14) and then to a diffraction grating (reference item 18) where it is then passed to a series of photodetectors



Art Unit: 2856

(reference item 22). The sample cell would normally have a series of light guides that allows the radiation from the light source to be properly directed through the solute in the sample cell. In Helms *et al.* there are a plurality of cells (reference items 14 and 182) each receiving and transmitting light. Combined with the teachings of Horsman *et al.*, one would know to provide a sample cell that allows light to traverse through the cell to a photodetector. Helms *et al.*, however, does not expressly teach the use of light guides. In the event that Helms *et al.* does not have light guides, Dahms teaches a chromatography system comprising a sample cell (reference item 10) as best seen in Figure 2. The apparatus comprises a light source (reference item 84) and a collimating lens (reference item 86) that directs radiation to a first light guide (reference item 82), through a sample, and then through a second, adjacent light guide (reference item 80) before reaching a light detector (reference item 90). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of Helms *et al.* in view of Horsman *et al.* with the teachings of Dahms in order to obtain at least one sample cell comprising adjacent light guides so that the radiation from the light source is properly focused and/or otherwise directed through the sample so that proper chromatography results can be obtained.

***Allowable Subject Matter***

10. Claims 3 would be allowable if rewritten to overcome the rejection(s) under 35

U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

11. Claims 5-8, 11-12, and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Art Unit: 2856

12. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of chromatography does not teach the use of a sending circuit for transmitting signal data to a multiplexing circuit where the sending circuit has a fast rise time (defined as at least  $\frac{1}{2}$  the multiplexer entire cycle repeat time) and a flat top response. The prior art of chromatography does not disclose a preferred embodiment where the light pipes that guide radiation have ends between 0.02 and 5 ml apart, which help prevent the formation of bubbles in the sample cell. Furthermore, the prior art does not teach a chromatography system wherein the light guides permit radiation from the diffraction grating to pass through.


13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Rogers whose telephone number is (703) 305-4451.

The examiner can normally be reached on Monday - Friday (0730 - 1600).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron E. Williams can be reached on (703) 305-4705. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

dar  
January 22, 2004

  
HEZRON WILLIAMS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800